

ENVIRONMENTAL AND SOCIAL ISSUES

When developing a product, the designer must consider not only the function of the product, but also broader environmental and social issues.

Environmental and social impact

Making products uses resources, including the materials used in the product and the energy needed to make it. Using these resources has an impact on the environment and society.

The designer of electronic products should consider a number of factors in order to reduce environmental impact, including:

- the material used to make the product
- the life of the product
- disposal: what happens to the product at the end of its life?

Materials

Reducing the use of materials

While the choice of electrical components is decided by what the circuit needs to do, the designer can choose the materials for the enclosure.

One way to reduce impact on the environment is to **use less material** in the enclosure. This might mean asking questions about what materials are needed or whether the enclosure could be made smaller (or thinner) and still do the same job. It could also mean using an alternative material with better properties, so that not as much of the material is required.

Using renewable resources

Some materials have less impact on the environment than others. A renewable resource is one which can be replaced naturally in a relatively short time. Wood from managed softwood forests is renewable, because these trees can be regrown in a few years.



In comparison, most plastics are made from oil. Oil is a **non-renewable resource**, meaning that there is only a certain amount of oil available and as it is used it cannot be replaced. Using non-renewable resources means that they will eventually run out.

By-products

Most manufacturing processes produce various kinds of **waste** as a by-product. Sometimes these by-products contain toxic substances harmful to people or the environment.

When choosing the materials to use, the designer should consider how they will be made and any by-products that these processes might produce.



The life of the product

Most products are only expected to last for so long before they stop working, are worn out or are thrown away. How long a product will last is an important design consideration.

The longer the product's life, the fewer new materials will be needed for replacements. However, a longer life also means that the manufacturer will sell fewer replacement products.

The life of a product can be extended by **using materials with better properties**: eg by using stronger materials or materials that resist corrosion. Another way is through design that allows product life to be extended by maintenance.



Design for maintenance

Maintenance means any activity that allows the product to have a longer life: it can include anything from repairing worn-out parts to replacing batteries.

Designing a product to allow maintenance means including features that allow parts to be easily replaced, such as access panels and standard screws. Alternatively, the product might be designed to be made from a series of standard modules, meaning that if something went wrong, only the faulty module would have to be repaired or replaced.



Disposal

At the end of almost any product's useful life, it has to be disposed of in some way. How this is carried out can have a significant impact on the environment.

A large proportion of electronic products end up in **landfill**, buried in underground rubbish dumps. This is one of the least environmentally friendly methods of disposal.

Hazardous materials

Care needs to be taken to correctly dispose of hazardous chemicals in batteries. If these were placed in landfill sites they would cause pollution.

In many areas there are special recycling centres for batteries and other electronic products that may contain dangerous materials, such as microwave ovens and fridges.



Recycling

Recycling means reprocessing a material so that it can be used again. This helps to minimise damage to the environment by reducing the need for new materials. For example, melting plastic parts so that they can be shaped into new products.



Symbols are used on plastic products to show the type of plastic used, so that it can be sorted into different types and recycled.

Electronic circuits can be difficult to recycle, as the cost of removing the components is often more than the cost of replacing them. Designing electronic products to be recycled may involve using modular systems or allowing the enclosure to be easily taken apart and separated from the circuitry.

Biodegradability

If it is essential to dispose of a product in landfill, ideally the material should be biodegradable (it will decompose relatively quickly), as opposed to non-biodegradable materials that take many years to break down. For example, most plastics made from oil are non-biodegradable and may take hundreds of years to decompose.



Packaging materials

Product packaging can also be made from biodegradable material. This is an important consideration as packaging materials are often thrown away.

Social and moral issues

When creating a product, the designer should also consider how it will be made and how it will be used. Many of these decisions have **implications for society as a whole** and are based on moral judgements. This means that the designer has to be very aware of what is acceptable and what is not acceptable to society.

Making products

Most people would prefer the products they want to be **low cost and good quality!**

Welding robots at work for LeBaron cars

Manufacturing costs can be **reduced** by:

- **Automating the manufacturing process.** However, this means that fewer people are employed.
- **Moving production to countries where labour costs are lower.** Sometimes conditions for workers are below UK standards, and pollution may be higher. There is also an environmental cost in transporting goods all over the world.



Using products

Modern society is very dependent upon electronic products. Many of these changes are positive, but the designer also has to consider the possible negative effects. For example, mobile phones make it easier for people to communicate, but using them inappropriately (eg while driving a car) can increase the risk of accidents.

Environmental and social issues – Test

INSTRUCTIONS – Copy the question into your jotter then choose the correct answer and write that underneath the question.

1. What is meant by recycling?
 - Reusing the parts of a product in other products.
 - Reprocessing the materials in a product so that they can be used in a different product.
 - Sorting waste into different types of material.

2. Which of the following could be a social disadvantage of automating manufacturing processes?
 - Fewer people are employed.
 - The conditions for workers in a lower cost country might be poor.
 - The cost of the product is normally higher.

3. In terms of material, what is meant by renewable?
 - Repairing a product so it works as if it were new.
 - Something that can be replaced naturally in a short time.
 - Reusing the materials within a product.

4. Which of the following is a disadvantage of extending the life of a product?
 - Fewer materials are needed for replacement products.
 - The product will not work after the end of its usable life.
 - The manufacturer will sell fewer replacement products.

5. What is meant by maintenance?
 - Repairing a broken product.
 - Using a product for longer than its usable life.
 - Any activity that extends the life of a product.

6. Why shouldn't batteries be disposed of in landfill?
 - New resources are needed to make replacements.
 - They contain hazardous chemicals that cause pollution.
 - They are biodegradable.

7. Why are electronic products often disposed of in landfill rather than recycled?
 - They can be reprocessed into other products.
 - Replacement products are widely available so they don't need to be recycled.
 - The cost of removing the electronic components is often more than the cost of replacing them.

8. Which of these is an example of a non-renewable resource?
 - Oil
 - Wood from a managed softwood forest
 - A plastic made from plants